Claims:

1. A method of monitoring flow in a flow pipe, the method comprising:

providing a flow pipeline having

a photon detector at a first position on the periphery of said pipe,

a first photon source at a second position on the periphery of said pipe, said detector and first source defining a first chord across said pipe, and

one or more additional photon sources at positions on the periphery of said pipe defining one or more additional chords across said pipe;

determining the density across said first chord from the count rate detected from the first source by the detector; and

determining the densities across said one or more additional chords from the count rate detected from the one or more additional sources by the detector.

2. The method according to claim 1 wherein the first source is diametrically opposite the detector.

3. The method according to claim 1 or claim 2 wherein the flow is a mixed flow comprising at least two phases including a solid phase, said method further comprising:

determining the deposition of solid in the pipe from the relative densities across said first chord and said one or more additional chords.

4. The method according to claim 1 or claim 2 wherein the flow is a mixed flow comprising at least two phases including a solid phase, said method further comprising:

determining the average phase fraction of solid in the pipe from the densities across said first chord and said one or more additional chords.

5. The method according to any one of claims 1 to 4 wherein the first photon source and the one or more additional photon sources are of different photon energies.

6. The method according to claim 5 wherein the first photon source and one or more additional photon sources are of successively decreasing photon energies.

7. The method according to any one of claims 1 to 6 wherein the photon sources are chemical isotope sources.

8. The method according to any one of claims 1 to 7 wherein the detector is positioned at the uppermost point on the periphery of the pipe and the first source is positioned at the bottommost point on the periphery of the pipe.

9. The method according to any one of claims 1 to 8 comprising positioning the detector, the first source and the one or more additional sources on the exterior surface of the pipeline.

10. The method according to any one of the preceding claims wherein the one or more additional sources comprise one or more pairs of identical gamma ray sources, each said pair of sources being positioned on the periphery of the pipe such that the chords across the pipe defined by each member of the pair with the detector are approximately of equal length, the average hold-up

being determined from the average value of the densities across said chords.

11. The method according to any one of claims 1 to 9 wherein the one or more additional sources comprise at least one pair of non-identical sources positioned on the circumference of said pipe, such that the chords across the pipe defined by each member of the pair with the detector are approximately of equal length, the asymmetric deposition of solid in the pipe being determined from the relative density values determined across the chords defined by each member of the pair with the detector.

12. The method of any one of claims 1 to 11 wherein the photon detector is a gamma ray detector.

13. The method of any one of claims 1 to 12 wherein the first and the one or more additional sources are positioned one the periphery of the pipe successively closer to the detector.

14. An apparatus for monitoring flow in a flow pipe comprising;

a photon detector adapted for attachment at a first point on the periphery of said pipe;

a first photon source adapted for attachment at the periphery of said pipe opposite the detector, said detector and first source defining a first chord across said pipe;

one or more additional photon sources adapted for attachment at positions on the periphery of said pipe successively closer to the detector, said detector and

one or more additional sources defining one or more additional chords across said pipe; and

a processor adapted to determine the densities across said first and one or more additional chords of the pipe as a function of the count rate detected by the detector from the first and one or more additional sources, respectively.

15. The apparatus according to claim 14 wherein the detector, the first source and the additional sources are adapted for attachment to the exterior surface of a pipeline.

16. A pipe having an apparatus according to claim 14 or claim 15 attached thereto.

17. Use of an apparatus according to claim 14 or claim 15 in a method of monitoring flow in a mixed flow pipeline.

18. A method or apparatus for monitoring flow in a mixed flow pipeline which is substantially as described herein and with reference to the accompanying drawings.